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KITCHEN APPLIANCE

DESCRIPTION

The invention relates to a kitchen appliance, particularly a mixing-chopping device having the features described in the preamble of claim 1.

Motor-driven electrical appliances often require a cooling device. Air cooling via a flow of cooling air that may be generated via fan vane driven by the drive motor represents the usual approach for smaller appliances. An air inlet and an air outlet are required to assure effective guidance of cooling air, and they are typically arranged on opposite sides of a housing. One example of such a motor-driven electrical device is a domestic mixer-chopper. These mixers or blenders have a motor housing with an electric drive motor and a jar that is usually placeable on a top side of the housing, and in the lower area of which a blade shaft or tool shaft can rotate about a vertical axis. The jar, which is open at the bottom can normally be detached from the housing together with the base portion in order to empty the previously chopped and/or finely mixed contents into a receptacle. The base portion of the jar is typically constructed as a bowl support which seals the jar connected to it from the outside and from the motor, and at the same time serves as a fixture for the blade shaft, which is detachable from a driven shaft of the drive motor.

Cooling devices for dissipating the lost heat created in the drive motor of a mixing-chopping device during prolonged operation are known. For example, US Patent No. US-A-5 273 358 describes a mixing-chopping device having a fan vane on a lower shaft stub of a vertically rotating motor shaft. An air outlet channel is located in a bottom housing cover arranged over the housing floor. The rotating fan vane assures cooling of the drive motor during operation.

One object of the present invention relating to a motor-driven kitchen appliance, particularly a species-related mixing-chopping device, is to simplify the air routing of air, and particularly the housing components for routing the air.

This object is solved with a kitchen device having the features described in claim 1 by constructing the air duct integrally with a housing of the device. In this way, no additional housing parts are needed, which would increase the production and assembly effort. The air routing is thus integrated in the housing in such manner that the assembly effort required is essentially the same as for a variant with no cooling.

The air duct is preferably arranged in a housing floor, where it may be accommodated easily without restricting the downward outflow for example. In particular, the air duct may be configured as a slot-like aperture, which is sufficiently narrow to provide some protection against foreign bodies getting into the housing interior. Alternatively, the air duct may also be arranged in a lateral, lower area of the housing, where it may be accommodated equally easily, without restricting the downward outflow for example. In this variant, the housing opening of the air duct is preferably covered by a mesh or similar.

An additional barrier wall may be arranged above the air duct and may provide additional partitioning of a lower chamber from the housing interior. This prevents a short circuit of the flow past the drive motor and ensures that all of the cooling air displaced by the fan vane flows over the drive motor.

The stream of cooling air preferably flows from top to bottom through the housing and the drive motor, so that parts exposed to heat such as a coupling and an upper bearing may be cooled first, before the flow passes through the drive motor, which heats up more quickly as the operating time is increased. An air inlet is preferably provided in a top side of the housing, so that the still cool air flows through the parts to be cooled above the motor first, and only afterwards through the drive motor.

One configuration of the invention provides that a fan vane creating a flow of cooling air is arranged close to the air duct. The fan vane is preferably seated on a lower shaft stub of the motor shaft. The fan vane may then redirect a flow passing axially through the motor into an air flow exiting radially, and which subsequently exits the air outlet channel horizontally.

According to a further embodiment of the invention, the air duct has a profile that is rectangular in sections and is delimited laterally by a partition wall of the housing. This partition wall may include e.g. a cable guide or similar.

In addition, a covering is preferably provided as an air routing device, and which at least partially encloses the fan vane radially and/or axially, and is radially adjacent the air duct on one side. In this way, the air may be directed in the housing and it is ensured that all of the cooling air displaced by the fan vane leaves the housing through the aperture. The covering may optionally form a lower support for the motor shaft in the housing. For this purpose, it may be advantageous if the covering is supported in the housing in a manner to damp vibrations via an additional damping ring.

When the housing is mounted on the housing base, the air duct is preferably sealed off laterally by a vertical housing wall, particularly a back wall. The back housing wall thus forms a closure for the side of the air duct, which is still open after the housing floor has been produced. When the housing has been assembled, only a slot-shaped opening remains in the floor or the alternative opening in the back wall of the housing.

At least the housing and/or the housing floor of the kitchen appliance is preferably produced via an injection moulding process. In this way, the air duct may be produced via a removable core in an injection moulding die, so that the entire manufacture of the kitchen device may be performed very simply and inexpensively.

Further features and advantageous refinements of the invention will be apparent from the dependent claims and the following detailed description of the drawing. In the drawing:

Figure 1 is a diagrammatic cutaway representation of a mixing-chopping device;

Figure 2 is a partial cross-section through a housing of the mixing-chopping device to illustrate the flow of cooling air and

Figure 3 is a partial cross-section through a lower portion of the housing with an integral air duct.

In the following, a kitchen appliance according to the invention will be explained with reference to a mixing-chopping device 10. The mixing-chopping device 10 is equipped with a rotating tool shaft 12 and includes a housing 14 with a driving means arranged therein, preferably an electric motor 16 (see Figure 1). An operating element 18 is provided on the front side of housing 14 to allow operation of the functions of mixing-chopping device 10.

Tool shaft 12 with blades 20 arranged thereon has a vertical axis of rotation and protrudes into a jar 22 that is set on a top side of housing 14, and that may be removed therefrom as required. Jar 22 has an open underside 24 with a circular rim 26, which has a cylindrical outer surface with an external thread or bayonet fixture or similar located thereon. This corresponds with a matching internal thread or mating fixture of a bayonet lock of a jar support 28. Jar support 28 may be removed from housing 14 together with jar 22, and in this case it closes off open underside 24 of jar 22. When jar 22 is securely attached to jar support 28, tool shaft 12 remains attached thereto even when jar 22 is removed, since the shaft is supported in a bearing plate, which is fixed between jar 22 and jar support 28.

When in position, jar support 28 is located in a corresponding seat 30 on a top side 15 of housing 14, and is normally locked there, so that it cannot be detached inadvertently.

Figure 2 illustrates a flow of cooling air 8 through housing 14 and drive motor 16. An air inlet 34 between housing top side 15 and jar support 28 enables cooling air to enter, which air then passes through an upper area of housing 14, cooling parts including a coupling 32 between driven shaft 36 of drive motor 16 and tool shaft 12 as it does so. Coupling 32 serves to separate the axial transfer of force when jar 22 and/or when jar support 28 has been removed from seating 30 in housing upper part 15.

The cooling air flows vertically from top to bottom through housing 14, flows through drive motor 16 and then enters an air duct 38, which is arranged in a lower area of housing 14. The air exits housing 14 through an aperture 56 in housing floor 50. The cooling air flow 8 passing vertically through housing 14 is created by a rotating fan vane 40, which is arranged on a lower shaft stub 42 of driven shaft 36 and rotates at the same speed as the stub. Fan vane 40 draws air in axially and forces air outwards radially.

A horizontally arranged barrier wall 44 separates an upper area of the housing interior from a lower chamber 46, in which air duct 38 is located. Barrier wall 44 prevents cooling air flow 8 from passing around the outside of drive motor 16 without cooling it adequately. The side of fan vane 40 facing air duct 38 is clad with a covering 48 which only permits a preferred radial outflow direction, towards air duct 38. Covering 48 partially encloses fan vane 40 radially and axially, so that the vane only forces the air into air duct 38, which is adjacent and flush with covering 48, as is indicated by the direction arrow for cooling air flow 8.

In the embodiment shown, covering 48 serves both to accommodate an outer bearing seat of a lower shaft bearing, which may be configured optionally as a sleeve bearing or a roller bearing. An upper shaft bearing is arranged directly below coupling 32. Covering 48 is braced against housing floor 50 via a ring-shaped support 54 projecting therefrom, wherein an additional damping ring 60 is provided between covering 48 and support 54 and serves to damp oscillation, vibration, and noise by preventing radial eccentricities of the motor shaft from being transferred without damping to housing 14, where they may cause structure-borne sound effects for example.

Figure 3 shows a partial section illustrating a lower area of housing 14 with air duct 38 arranged therein. This extends downwards as far as housing floor 50 and is limited at the top by barrier wall 44. In the embodiment shown, air outlet channel 38 is rectangular in shape and its width is approximately the same as the outer diameter of fan vane 40. Ring-shaped support 54 for covering 48 (not shown) is visible inside lower chamber 46, in which the lower shaft bearing is also arranged and into which lower shaft stub 42 of driven shaft 36 extends. When

covering 48 is inserted, a semi-circular ring ridge 52 insulates lower chamber 46 from the upper part of housing 14.

Air duct 38 is delimited laterally by a partition wall 58, which extends roughly parallel with a lateral outer housing wall (not shown), and which meets barrier wall 44 at right angles thereto in the area of air duct 38. Partition wall 58 may isolate e.g. a cable guide or similar from the driving and air duct area of housing 14.

When housing 14 is mounted on housing floor 50, a back wall 62 of the housing (see Figure 2) closes off a channel opening 64, leaving only a slot-shaped aperture 56 free, through which the cooling air is forced downwards out of housing 14.

The illustrated configuration according to the invention of the air duct, and particularly of the integral design of the air duct in the housing is associated with advantages for production, since no additional housing parts are necessary for the seat of the fan vane and for directing the air to the outside. The integral conformation of the housing aperture enables reduced costs when manufacturing the electrical device.

The illustrated configuration of air duct 38 may particularly be realised by an injection moulding process, in which a removable core determines the shape of channel 38. After the injection process, this core is withdrawn through channel opening 64 so that the finished housing floor 50 may be removed from the mould. Channel opening 64 is then closed of when housing 14 is assembled by the back wall 62 thereof.